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"Westonite"

Just over a year ago, under the heading of "An Interesting Rumour," we wrote of news reaching us from the United States about a new type of sand for foundry use. This has now materialised in a substantial manner, for it is giving complete satisfaction in large-scale production at Lynchburg, Virginia. The details of this new development have been the subject of an article by Mr. William G. Gude, managing editor of the "Foundry."

It seems that the sand coating was invented by Mr. B. M. Weston, of Foundry Development Engineers, Inc., United Artists Building, Detroit, and is known as Westonite. It is a liquid plastic of petroleum origin of very low viscosity and is said to be a resin, carried in a solvent, the mixture being water soluble. After mixing in the mill, the sand becomes coated with Westonite and requires drying at 175 deg. C. "The resulting coating is non-thermo setting; it will not fuse, but it will burn completely without an ash residue. Commencement and completion of combustion are regulated by a catalyst in the coating." Naturally, to take care of core-sand increments to weight and to re-coat the grains which have lost their bond through combustion, small further additions are made. To instal the new system, 150 tons of sand were needed and for keeping it in condition three to four quarts of Westonite mixed with an equal quantity of water per ton of sand reconditioned are required. A cereal and bentonite are also incorporated in the base silica sand.

The outstanding characteristic of the sand is its flowability, which naturally shortens mixing time, and the number of jolts for ramming is said to be reduced by about 50 per cent. Whilst the gas generation on casting is somewhat higher than with normal practice, it is non-toxic and not objectionable. The absence of coal dust is appreciated by the operatives. The surface finish on the castings is said to be so good that many economies have been effected in the fettling shop. Under American conditions, the Lynchburg concern reports a daily saving of the order of £100 a day, when handling about 850 tons of sand. The company now only uses the new sand in the mechanised shop, but it has the intention of converting the other departments, including floor moulding served by Sandslingers, to utilise Westonite.

It is a matter for regret that no information, so far, has been disclosed as to the nature of the gases released from the sand during pouring. We imagine that they will be hydro-carbons and more or less resemble those derived from the use of coal dust. A factor of great interest is the low moisture content of the sand, which, if our arithmetic be correct, is of the order of only 4 per cent. The reduction of steam at the mould face may have an important influence on both the surface condition and the soundness of castings, especially in the non-ferrous field.

There is always a time lag between discovery and commercial use and a second one in foreign exploitation. We hope that in this case it will not be too long before the process can be tried out under British conditions. The process, as disclosed, does not promise to be revolutionary, but it does seem to show potentialities of a worth-while character, especially in the direction of making the grey-iron foundry less like a coal shed. The progress made by the new bond in the States will be followed with interest by the rest of the world.

Contents

"Westonite," 133.—Cellulose Derivatives as Core Binders in German Foundries, 134.—The Italian Pig-iron and Steel Industry, 137.—Importance of Radiography in Inspection, 139.—Belgium Revisited, 141.—B.I.S.R.A. Projects, 143.—Additions to Metal Coreboxes, 145.—Copper Uncertainty, 147.—Vickers' Return to Commercial Work, 148.—Effects of Taxation on Production, 148.—Stewarts and Lloyds' Record Order-books, 150.—Scottish Industrial Survey, 150.—News in Brief, 151.—Aluminium Interests Merged, 154.—Raw Material Markets, 156.—Non-Ferrous Metals, 155.—United Kingdom Tin Position, 156.—Revision of Export Licensing Controls, 156.

Private Trade with Japan

After consultation with the United States Military Authorities in Japan, the Board of Trade have issued the following orders by which restrictions on private trade with Japan have been relaxed:—

Trading with the Enemy (Authorisation) (Japan) Order, 1947 (S.R. & O., 1947, No. 1031).

Trading with the Enemy (Transfer of Negotiable Instruments, etc.) (Japan) Order, 1947 (S.R. & O., 1947, No. 1032).

Trading with the Enemy (Custodian) (Amendment) (Japan) Order, 1947 (S.R. & O., 1937, No. 1033).

Copies of these Orders, price 1d. each, will be obtainable in due course through any bookseller, or direct from H.M. Stationery Office, Kingsway, London, W.C.2.

Notes from Belgium

La Fonderie Belge announces that a group of the members of the Association Technique de Fonderie de Belgique is to visit this country towards the end of June. They can be assured of a hearty welcome.

The session now ending has seen a succession of lectures from this country. Amongst the speakers there have been Mr. Fassotte, Mr. Delport, Mr. Braidwood and Mr. F. Hudson.

A recent issue of "La Fonderie Belge" contained Mr. René Deprez's Presidential Address in which he covered the history of his Association since its inception in 1911 and disclosed his plans for the future of the Belgian foundry industry.

A fairly full translation of Dr. Harold Hartley's Presidential Address was given and annotated.

Duty on Bonus Issues

The Federation of British Industries and the Association of British Chambers of Commerce have submitted to the Press a logical objection to the proposed duty on bonus issues. It is pointed out that the Chancellor of the Exchequer has quite often supported the notion of ploughing back profits into businesses, and yet now he proposes to tax the concerns which follow his advice. Obviously the company does not benefit one penny from issuing bits of paper. The shareholder may benefit because of a stock exchange transaction, but not the company—so why tax the company?

Polish Pipe Foundry

The "Ostrowiec" pipe foundry in Poland will restart in August. The works will produce pipes 80 to 300 mm. in diameter and 3 to 5 m. in length. Pipes of this type are necessary at home and production of these castings will present possibilities for Polish export.

Purchase Tax

The following information regarding the liability to tax of certain domestic appliances and domestic apparatus is published by the Commissioners of Customs and Excise, after consultation with trade interests concerned, as supplementary to that given in Notice No. 78G:—

Chargeable at the rate of 66⅔ per cent.

Stoves, grates, ranges and fireplaces designed for burning solid fuel and having also provision for alternative or supplementary heating by electricity or gas, e.g., fireplaces with electric radiator panels, solid fuel fired ovens with gas burners. (In the case of an assembly comprising a solid fuel fire or cooking range with a separate gas or electric stove en suite, tax is chargeable only on the gas or electric stove.)

Not Chargeable

Domestic stoves, grates, ranges and fireplaces designed for burning solid fuel only, but having (*a*) built-in provision for gas ignition, or (*b*) combustion controls operated electrically.

Standard Conditions of Sale

The Council of Ironfoundry Association's Standard Conditions of Sale (1946) were originally divided into two sections—Basic and Supplementary. In a reprint which has now reached us no such division exists, nor will it in the future.

Passports and Travel Identity Cards

Applicants for passports or travel identity cards, or for renewal or endorsement of existing passports, need no longer go or write directly to the Passport Office in London or the Branch Passport Office in Liverpool of Glasgow. Applicants can now obtain the necessary application forms, receive guidance in completing their applications, and hand over the applications with any fees payable, at the nearest Employment Exchange or Resettlement Advice Office of the Ministry of Labour and National Service.

Stove Design Competition

The Council of the Royal Society of Arts have accepted the recommendation of the Industrial Art Bursaries Board to hold a competition this summer for British students of Schools of Art in Great Britain in which bursaries of £150 each will be offered in four groups, one of which is an "open-close" stove design. This has been offered by the Coal Utilisation Joint Council, and will be open to students of any form of three-dimensional design. The closing date for the receipt of entry forms is June 30, 1947. These may be obtained, together with copies of the conditions of the competition, from the Secretary of the Society, 6, John Adam Street, London, W.C.2. Designs submitted for the first round of this competition will be required by October 1, 1947. Although the age limit will be 18 to 25, the upper limit may be extended at the discretion of the juries in the case of ex-service candidates.

Cellulose Derivatives as Core Binders in German Foundries*

By O. R. J. Lee

During a visit to Germany with a M.A.P. team investigating light alloy foundries, samples of Alkylin were obtained from the manufacturers, Kalle & Company, Wiesbaden. Alkylin 360 was described by them as methyl cellulose prepared from wood pulp, and Alkylin 260 as cellulose glycollic acid. These products were initially developed as adhesives and emulsifying agents, but in view of the difficulty in obtaining oil, starch or cereals for coremaking in German foundries, they were used as core binders and found to have very satisfactory properties. Most foundrymen said that they would not abandon Alkylin after the war and no adverse reports were obtained.

Some references to Alkylin and emulsion type binders in the German literature are listed at the end of this Report. The claims made in the German trade literature are mainly for low hot strength, which overcomes tearing difficulties in light alloy castings and for low temperature of decomposition, which gives excellent knock-out characteristics. Reports from foundries using these products indicate that the low gas evolution from these binders was a further decided advantage. There is also a possible economic advantage in the low drying temperature required.

Method of Use

German trade literature on Alkylin 360 gives the method of use as follows. On to 7 parts of water sprinkle 1 part by weight of Alkylin (a sawdust-like solid) and stir well, leave overnight to gelatinise. In this form, the binder will keep for long periods of time. This emulsion is mixed with dry silica sand in the ratio of 8 parts to 100 by weight in a normal core sand mixing machine. The sand mixture hardens on exposure to air because of loss in moisture, but can be stored for 24 hours if kept under a damp sack. Alkylin 260 was a later development as far as foundry applications were concerned and the only technical information obtained was on a single typescript page dated 10/5/44. This suggested a solid binder content of 0.5 to 1.0 per cent., together with 6 to 7 per cent. moisture in the prepared sand. No. 260 is more soluble in water than 360 and trials had been made with very finely powdered Alkylin 260 to mix the binder with the sand and add water, whilst milling in the usual foundry fashion. Although this was stated to be a promising development, it was not possible to obtain a sample of the specially finely divided material.

The recommended drying temperature for cores was 150 deg. C., but no times were stated in the literature.

From inquiries in foundries, one or two hours seemed to be the time employed for small and medium sizes of core. The Germans were using Alkylin binders for aluminium alloy and for copper and ferrous alloy castings. For castings in the higher melting point materials, increased hot strength was obtained by suitable additions of clay bond and large cores bonded with Alkylin 360 and cement were used in German iron and steel foundries.

Experimental Results and Discussion

Methods of Preparation

The solid binders were sprinkled with continuous stirring on to the surface of water in a beaker and left overnight to gelatinise. The German recommendations for No. 360 are to make an emulsion consisting of one part binder in seven parts of water. This ratio was adopted at first for both binders, but did not give equivalent viscosity of emulsions, Alkylin 260 being more viscous than Alkylin 360. To facilitate hand mixing of small batches, the ratios of binder to water finally used were as follows: Alkylin 360, 1:7; Alkylin 260, 1:8. When gelatinised, the binders were added in varying proportions to Parish's No. 1 silica sand, from which the fractions retained on 60 mesh and passing 100 mesh had been removed. The results of tests on the core mixtures so obtained are given in Table I.

TABLE I.—*Properties of Cores Bonded with Cellulose Derivatives.* Base Sand Parish's No. 1 (fraction passing 60 mesh and retained on 100 mesh.)

More Make-up		Dry Compression Strength, Lb./in.²	Dry Permeability, A.F.A.	Gas Evolved by Binder, Ml./gm.	Per cent. Strength remaining after 24 hrs./100 per cent. Humidity/20 deg. C.
Binder, Per cent.	Baking, hrs./° C.				
Alkylin 360					
1:7 emulsion.					
0.75	1/150	77	132	5·8	—
1.1	1/150	86	128	7·4	—
1.25	1/150	115	126	9.4	—
1·0	2/150	109	130	9·4	—
1.0	3/150	111	122	7.4	—
1.0	2/120	105	131	5.0	80
1.0	3/120	139	136	9.2	—
1.0	1/180	88	131	7·6	—
1.0	3/180	84	133	10.4	—
1.0	½/250	26	—	—	—
Alkylin 260					
1:8 Emulsion.					
0.66	1/150	192	150	2.6	—
0.9	1/150	255	147	4.0	28
1.1	1/150	301	147	6.4	—
0.9	2/120	238	162	4.0	—
0.9	½/250	97	—	—	—
0.9	½/250	13	—	—	—

* Reproduced by permission of the Controller, H.M. Stationery Office.

Cellulose Derivatives

Green Strength

Tests were made on the standard A.F.A. test samples 2 in. diameter, 2 in. high. A few tests of green compression strength were carried out on a rather insensitive machine and values around 1 lb. per sq. in. were obtained. The green strength was adequate to withstand ejection of the test piece from a one-piece core box by the standard stripping post technique.

Dry Compression Strength

Alkylin 360

Increasing the quantity of binder from 0.75 to 1.25 per cent. increased the strength from 77 to 115 lb. per sq. in. after baking for 1 hour at 150 deg. C. With 1.0 per cent. binder, an increase in making time to 2 hours increased the strength by 23 lb. per sq. in., but a further increase to 3 hours had little further effect. Variation of the baking temperature from 120 to 180 deg. C. only slightly affected the strength, but the increase of strength with time of baking was most evident at 120 deg. C., and at 180 deg. C. there was in fact a slight fall in strength with time of baking. A temperature of 180 deg. C. is evidently about the maximum at which baking can be carried out without decomposing the binder. A short time of baking at 250 deg. C. gave cores of very low strength.

Alkylin 260

This binder gave high strengths varying from 192 to 301 lb. per sq. in. as the amount of binder was increased from 0.66 to 1.1 per cent. It is clear that less than 0.66 per cent. additions would give useful strength values. By baking for 2 hours at 120 deg. C. a strength was obtained similar to that after 1 hour at 150 deg. C. Baking at 250 deg. C. rapidly destroyed the bond, causing the strength to fall to negligible proportions.

Moisture Absorption

One set of baked cores made from each binder was submitted to compression testing after standing for 24 hours in a 100 per cent. humid atmosphere at 20 deg. C. Alkylin 360 bonded cores were reduced to 80 per cent. of their dry strength and Alkylin 260 cores were reduced to 28 per cent. Schubert[5] considers that a final strength greater than 50 per cent. of the original, indicates satisfactory storage characteristics after baking.

Dry permeability was measured by the B.C.I.R.A. unmodified method and for both binders in all conditions of baking, etc., the results were in the range 122 to 162. A noteworthy feature was that increasing the amount of binder did not affect the permeability, although the strength was improved.

In the first instance the gas contents were measured in a manner similar to that described by Dietert.[6] The tube furnace temperature was maintained at 750 deg. C., the maximum temperature likely to be reached by core sand in light alloy foundry work. The apparatus was swept out with nitrogen before a 3 gm. sample of sand was inserted and the gas evolved was measured in a chemical burette by displacement of a solution containing 18 per cent. potassium sulphate and 5 per cent. sulphuric acid. This solution has a low solubility for the hydrocarbon gases likely to be evolved. A rough attempt was made to measure the rate of gas evolution by noting the volume after 30 and 60 secs. in addition to the final volume which was generally attained in 2 or 3 mins. In almost all cases the rate of evolution was roughly linear during the first 60 secs., but decreased rapidly after this time. This behaviour is similar to that of linseed oil binders.

The blank on the empty apparatus was high (8 to 8.5 ml.) owing to ingress of cold air into the furnace when the end bung was removed to insert the sample, but results obtained later with similar materials, in an improved apparatus giving a negligible blank, indicated the results in Table I are not in serious error.

Tipper[7] quotes the quantity of gas evolved from core sands at 800 deg. C. to range from 4.5 ml./gm. for concentrated sulphite lye bond, to 14.5 ml./gm. for linseed oil bond, all binders being added to the extent of 3 per cent. The gas contents shown in Table I for cores bonded with the cellulose derivatives are generally lower than the value given above for oil-bound cores, the Alkylin 260 being best in this respect.

Retained Strength

As a measure of knock-out qualities, a test for retained strength has been developed in America and comparable tests were applied in the present experiments, a batch of dried cores being placed in a furnace at 425 deg. C. for 15 mins., this being found to heat the outside of the cores for 5 mins. at the furnace temperature. The results in Table I do not contain any reference to retained strength values because in most cases the cores disintegrated during heating and any remaining were too weak to handle after cooling. Retained strength was therefore zero in all cases. Morgan[8] quotes a retained strength value of 218 lb. per sq in. for a linseed oil core baked for 60 mins. at 232 deg. C., which had a normal tensile strength of 226 lb. per sq. in.

The Americans have also developed tests for collapsibility of cores to give a measure of the resistance of the sand to contraction of the metal which might promote hot tearing. The method quoted by Morgan[8] for light alloy casting is to load (50 lb.) an A.F.A. core placed in a furnace at 650 deg. C. and note the time required for compression failure; 2.8 mins. was quoted for a linseed oil core mixture. Such a test was attempted in the present work, but even a load as low as 3 lb. per sq. in. caused immediate collapse, indicating that the core sands tested had excellent collapsibility.

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6 Dietert, Modern Core Practices and Theories, p. 374. A.F.A., 1942.
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8 W. C. Morgan, Trans. A.F.A., 1945, **52**, pp. 1317-1324.

The Italian Pig-Iron and Steel Industry

By Dr. H. J. Becker

Since the end of the war, Italy's pig-iron and steel industry has made relevant progress towards reaching the pre-war level, despite grave difficulties encountered through war damages, power shortage and insufficient raw material supplies. In 1945 Italian pig-iron production had declined to 7 per cent. and steel production to 14 per cent. of the 1938 figures. In 1946, however, the pig-iron production rose to 20 per cent. and the steel production even to 50 per cent. of the production in 1938.

Pre-war Development

The Italian iron and steel industry dates back to approximately 1870, when the first open-hearth industry was mainly based on French capital (Rothschild). Since 1884, when the Terni was founded, the influence of German capital increased. The foundation of the Ilva Company in 1904 brought four years of the greatest development of Italy's heavy industry. In the years before and during the first world war more and more Italian capital was invested, until all leading companies were financed by different banks —Ilva by "Comit," F.I.A.T. by "Credito Italiano," Ansaldo by "Banca di Sconto," and Breda by "Banco di Roma."

The years between the end of the war and the rise of Fascism brought heavy difficulties and relevant changes in structure and financial control. Then the industry advanced again rapidly and production of steel exceeded 1,000,000 tons in 1932. In 1933, the steel industry was practically taken over by the Government with the aim of securing independence from foreign supplies. Evidence of this is the rapid expansion of the electrical production of pig-iron and steel. In 1937, powers of control over this industry were placed in corporations and the financial control exercised by a special holding company, the Institute for Industrial Reconstruction (I.R.I.) and other Government agencies. In 1939, the steel industry reached a peak production of 2,344,000 tons.

Prior to the war there were 14 blast furnaces for pig-iron production with an annual productive capacity of approximately 1,250,000 tons of pig-iron. The Ilva Company operated 12 of these furnaces, three each at Bagnoli, Piombino, Portoferraio and Trieste, with a total daily production of 1,610 tons. The remaining two furnaces were operated by the Cogne Company at Aosta.

There were further 120 electric furnaces producing pig-iron, all located in Northern Italy, with an annual productive capacity of 280,000 tons. At the end of 1939 Italy had 310 open-hearth steel furnaces, with a yearly productive capacity of 2,600,000 tons, and about 170 electric furnaces, mainly in Northern Italy, capable of producing about 1,100,000 tons of steel a year.

Before the war there were 311 rolling mills in Italy, with a productive capacity of about 4,500,000 tons. The total capacity of the steel production and steel fabricating equipment has far exceeded production in its peak year. These capacities were built up to allow proper maintenance time for furnaces and to provide against the closing of a large number of old and inefficient mills, kept going by the availability of cheap labour.

Table I shows the number of iron and steel plants classified according to size in 1937:—

TABLE I.—*Iron and Steel Plants in Italy.*

Less than 100 employees ..	220 plants	with a total of	5,295 workers.
From 101 to 500 employees	100 ,,	,,	25,121 ,,
From 501 to 1,000 employees	17 ,,	,,	11,197 ,,
From 1,001 to 2,000 employees	10 ,,	,,	12,291 ,,
Over 2,000 employees ..	1 plant	,,	2,470 ,,
Total	348 plants	with a total of	56,374 workers.

War Damage

The heaviest war damage was caused to the blast furnaces for pig-iron production. The retreating Germans completely destroyed nine of the existing 14 furnaces and badly damaged one. Of the three Trieste furnaces only one has suffered heavy damage, but all three are now lost to Italy after the Peace Treaty. Thus, only three blast furnaces are now in operating condition in Italy, two at Aosta (Cogne) and one Ilva furnace at Bagnoli, completely repaired after destruction by the Germans. Therefore, the annual productive capacity is now reduced to little more than 200,000 tons.

The electric furnaces producing pig-iron, however, suffered far less damage, due to their location in Northern Italy, and their capacity is practically unchanged. The annual capacity of the open-hearth furnaces for steel production was reduced by about one-fourth through war damage to the Bagnoli, Torre Annunziata, Portoferraio, Piombino and Terni plants. The electric steel furnaces suffered practically no war damage.

TABLE II.—*Pre-war and Present Productive Capacity, in Tons.*

	Pre-war.	Present time.	Percentage reduction.
Pig-iron:			
Blast furnaces	1,250,000	225,000	72
Electric furnaces	280,000	225,000	20
Steel:			
Open-hearth furnaces	2,600,000	1,900,000	27
Electric furnaces	1,100,000	1,000,000	10

Bombing accounts for some of this damage, while part is due to considerable removals by the Germans, who, for instance, took away an important component of the S.I.A.C. installations, all electric furnaces of the Terni Company and a complete and most

The Italian Pig-Iron and Steel Industry

modern electric installation for pig-iron production of the same company.

It is estimated that Italy requires a yearly total of at least 1,300,000 tons of steel products, of which 300,000 tons each are needed for the manufacture of motor-cars and bicycles and for the small engineering industry, 150,000 tons for the building industry, 110,000 tons for the agricultural industry, 100,000 tons each for State railways and for the shipbuilding industry 50,000 tons for the tools industry, etc. To manufacture these 1,300,000 tons of steel products about 1,850,000 tons of steel ingots are required. This minimum figure may be rounded to 2,000,000 tons in view of temporarily arising needs and eventual export possibilities for certain steel products.

Pig-iron and Steel Production

The annual productive capacity of blast furnaces, as already mentioned, amounts to 200,000 tons, that of the electric furnaces to 250,000 tons, while the actual

TABLE III.—*Pig-iron Production in Italy.*

	Blast furnaces.		Electric furnaces.		Total.
	1,000 tons.	Per cent.	1,000 tons.	Per cent.	1,000 tons.
1900	24	—	—	—	24
1910	352	—	—	—	352
1914	379	—	—	—	386
1916	443	—	—	—	467
1918	244	—	—	—	313
1920	52	—	—	—	88
1925	472	—	—	—	482
1930	511	—	—	—	534
1935	561	89	65	10	625
1936	674	90	74	10	747
1937	683	86	106	13	790
1938	782	91	81	9	863
1939	869	86	139	14	1,008
1940	882	84	177	16	1,059
1941	777	75	259	25	1,036
1942	677	76	213	24	890
1943	481	75	163	25	644
1944	122	53	100	47	231
1945	—	—	61	100	61
1946	—	—	—	—	172

The above totals also include small quantities of pig-iron produced with charcoal furnaces.

pig-iron production in 1946 did not even reach 200,000 tons. This is mainly due to the fact that these capacities can be fully utilised only under extremely favourable conditions, especially as regards electric furnaces connected to the availability of electric power.

The estimated annual steel needs of about 2,000,000 tons of ingots require about 415,000 tons of pig-iron, in addition to steel scrap, while a further 200,000 tons are needed for the foundries, the requirements of which may increase in view of the railway reconstruction and the building programme. The actual capacity of Italy's pig-iron industry is thus exceeded by about 250,000 tons. This balance can be obtained by reconstruction of the remaining blast furnaces, increase of electric pig-iron production and by importation. An increase in the number of electric furnaces would also effect considerable economies in coal consumption. As regards importation, it may be mentioned that in 1946 about 25,000 tons have been imported. It is expected, however, that from 1948 on, importation of pig-iron will no longer be necessary, at least only in small quantities, because of the envisaged increase of domestic production by electric furnaces.

TABLE IV.—*Production of Steel Ingots and Castings in Italy.*

	Total production (1,000 tons).	Open-hearth production (per cent.).	Electric-furnace production (per cent.).
1900	308	—	—
1910	1,025	—	—
1916	1,262	—	—
1921	700	—	—
1925	1,786	—	—
1929	2,143	—	—
1930	1,774	—	—
1935	2,209	75	25
1938	2,323	73	27
1939	2,283	69	31
1940	2,254	67	33
1941	2,057	62	38
1942	1,929	60	40
1943	1,727	60	40
1944	1,025	48	52
1945	336	—	—
1946	1,149	—	—

Although the annual productive capacity of electric furnaces is, as already stated, about 1,100,000 tons, in practice not more than 800,000 tons can be obtained due to the electric power shortage. The remaining 1,200,000 tons must be obtained by open-hearth furnaces, if the estimated need of 2,000,000 tons is to be complied with, without importation. This is not a question of productive capacity, but of raw materials.

Raw Materials

For a production of 2,000,000 tons of steel ingots and their fabrication, the following raw materials are needed, including those for the production of 415,000 tons of pig-iron:—1,300,000 tons of iron ore; 1,830,000 tons of coal; 1,500,000,000 kw.-hrs.; 1,600,000 tons of scrap. Italy normally produced 75 per cent. of its raw ore requirements. The balance was imported. Existing stocks are still large in relation to the present rate of use and therefore, no imports will be necessary for some time to come. The largest import requirement is coal, which has to be imported almost entirely.

Italy's electric power production amounts at present to 20,000,000,000 kw.-hrs. per annum,, installations under construction will bring this figure to 25,800,000,000 kw.-hrs. in 1949. Further projects will bring later on an increase by another 4,400,000,000 kw.-hrs. It is estimated that Italy's rich water reserves would even permit a yearly production of 57,000 million kw.-hrs.

The availability of domestic scrap has always been, and is still now, slightly above 1,000,000 tons per year. The balance of 500,000 to 600,000 tons has also before the war always been imported, the bulk coming from the United States and France.

Importance of Radiography in Inspection*

By E. L. LaGrelius

Radiography, as practised by many foundries, has developed into a useful inspection tool and is becoming more frequently used as its applications and advantages are better understood. Formerly, it was used almost entirely as a development tool to shorten the time required to get a pattern into production. In this connection, it is used in place of sectioning a casting, which is time consuming. In addition, defects which would be discovered by X-ray are sometimes missed entirely when a casting is sectioned.

As the use of X-ray methods becomes more widespread in the castings industry, radiography is assuming increased importance in the inspection of castings. When used wisely, radiography can aid inspection in the following ways:—(1) Radiographs of sound castings assure the inspection department that it is receiving sound castings, similar to the pilot castings previously accepted by the purchaser; (2) radiography assures the inspection department that a uniform casting production procedure is being followed; (3) radiography is the only rapid method known which assures maintenance of a quality standard of internal soundness; (4) it aids in ascertaining whether or not a defect has been entirely removed through improved foundry technique; (5) it assures the inspection department that repairs made by welding are free from defects and that the entire defective area has been properly repaired; (6) radiography aids the inspection department to ascertain in many instances which foundry department is chargeable for the defect; (7) it enables the inspection department to find defects before considerable labour costs have been expended in cleaning or finishing; (8) radiography has an appeal for the customer. The inspection department is generally the liaison between foundry and customer and radiography aids inspection in presenting its problems to a customer. For example, it may be used to explain why a particular casting design will lead to a shrinkage cavity or other type of defect.

When such a problem arises, it is possible for the foundry to show a radiograph of the casting to the customer immediately after pouring, before any work of cleaning is done. The customer then has an opportunity to decide whether that defect will be detrimental to his product or whether he wishes to pay an additional cost to remove the defect in question or to alter his design to prevent it.

Although in recent years much information has been published on this subject, a review of the more important factors involved in radiography is worth while.

The development of radiographic equipment has progressed rapidly, during recent years, making it possible to radiograph all types of materials in different thicknesses. Generally, a foundry can choose radiographic equipment which is suitable for products now in production and products which may be produced at some future date.

At the present time, it is possible to secure a variety of equipment classified generally according to operating voltages. Typical classifications are:

For light magnesium and aluminium, 3,000 to 50,000 volts.

For heavier sections of magnesium and aluminium, 30,000 to 150,000 volts.

For light steel sections up to 2 in. in thickness, 60,000 to 250,000 volts.

For steel up to 5 in. in thickness, 1,000,000 volts.

For steel up to 8 in. in thickness, 2,000,000 volts.

In addition to this equipment, there is the betatron, which has not yet come into common use. The betatron can be used for X-raying thicker sections than are possible with the highest voltage X-ray units or the largest practical amounts of radium. Radium may be rented or purchased in amounts convenient for the examination of medium sections of steel and copper-base alloys.

Fluoroscopy, for examination of light metal castings and for exploratory examinations of thin section ferrous castings, is being used increasingly in cases where visual examination is sufficient and a permanent record is not required and where the lower sensitivity of fluoroscopic images is not a disadvantage.

Methods of Application

An inspection department is concerned primarily with interpretation and is not interested to a large extent in the mechanics of producing radiographs. Nevertheless, certain elements of radiographic technique must be agreed upon between the inspection department and the customer. Firstly, it is essential that all know which area of a particular casting is being discussed at any given time. This can be accomplished by means of a sketch or drawing called a radiographic position chart. This position chart should include:

(1) Radiographic areas, properly numbered and properly shown in respect to all other areas and the correct size of film.

(2) Direction of radiation.

(3) Applicable standard agreed upon by all interested parties.

Secondly, it is essential that all parties have the same concept as to the type of defects or discontinuities shown on a radiograph. It is helpful, when discussing a casting, to have that casting on hand so that surface markings and discontinuities can be identified on the radiograph. In reading radiographs, only those de-

*A Paper read before the 1947 Conference of the American Foundrymen's Association:

Radiography in Inspection

(*Continued from page* 139.)

fects which are internal should be considered. The common defects with their probable causes are enumerated below.

Gas Holes or Porosity

Gas holes appear as round or elongated, smooth-edged dark spots. These may occur individually, in clusters or distributed through the casting. This condition may be the result of imperfectly deoxidized metal, of gas formed by the vaporisation of moisture or volatile material from the mould surface, of excessive gas from a core because of insufficient baking or venting, or of the entrapment of air in the cope surface of a mould cavity.

Foreign Materials or Inclusions

These appear as isolated irregular or elongated dark areas, not corresponding to variations in thickness of material nor to cavities. This condition is caused by particles of sand from moulds or cores, entrapped slag or refractory materials, or oxides trapped in the metal during the pouring operations.

Shrinkage

Shrinkage appears as a dendritic, filamentary or jagged darkened area on the film. This condition indicates insufficient compensation for liquid shrinkage and is generally found at the centre line of a section, under improperly gated or shaped risers, or at the junction of thick and thin sections.

Hot Tears

These appear as ragged dark lines of variable widths. They may have numerous branches, but have no definite line of continuity although hot tears may exist in groups. They may start at the surface or be wholly internal.

Hot tears result when the normal contraction of the casting is unduly restricted by the mould and/or core during or immediately after solidification. Under these conditions, the magnitude of the restricting forces may be greater than the strength of the metal, which is low during, and immediately after, solidification. Improperly designed castings are subject to hot tearing.

Unfused Chaplets

Chaplets which fail to fuse with the casting are generally outlined wholly or in part by a dark line. In some cases the chaplet may be readily identified.

Unfused Chills

These often appear in their original shape as a dark area or outlined by a dark line. Unfused chaplets and internal chills are the result of cold metal or oversized chaplets or chills.

New Uses of Radiography in the Foundry

The field of radiography has not been entirely investigated and many new uses, no doubt, will be discovered as better equipment becomes available and its applications are further explored. Two applications, which have been explored partially, but are not, as yet, in general use in the foundry are: (1) the examination of complex mould assemblies to ascertain whether or not they have been fitted and assembled properly; and (2) the study of the flow of metals in moulds.

Italian Pig-Iron and Steel Industry

(*Continued from page* 138.)

TABLE V.—*Production of Steel Shapes, Sheets, Tubes, etc.* (*Tons*).

1935	1,906,999
1936	1,615,729
1937	1,707,655
1938	1,734,565
1939	1,692,263
1940	1,618,521
1941	1,691,358
1942	1,597,841
1943	1,261,332
1944	680,547
1945	293,005
1946	836,245

As an example of the field of steel fabrication, it may be mentioned that the 1938 total of 1,734,565 tons comprised 970,222 tons of bars, rails and sections, 169,684 tons of rods, 467,350 tons of sheets, and 127,309 tons of seamless tubes.

Companies Capitals and State Control

Through the Finsider group, part of the I.R.I., the Italian State controls five large industrial concerns, as follow:—Capital participation of Finsider: Ilva, 64.45 per cent.; Terni, 50.20; Dalmine, 50.66; S.I.A.C., 100.0; and S. Eustacchio, 50.00 per cent. The Finsider group, once controlling 75 per cent. of the total Italian pig-iron production, now controls only somewhat more than 25 per cent., due to the heavy damages sustained by the Ilva installations, and 48 per cent. of the actual Italian steel productive capacity. Another group, the Industrie Siderurgiche Associate (I.S.A.), comprising 32 small and medium size companies, controls 13 per cent. of the steel productive capacity.

Seven other groups, four large and three medium ones, may be mentioned. Of the larger ones, the Falck group controls 11 per cent. of Italy's steel production, the Cogne 10.2 per cent., the F.I.A.T. 8.2 per cent., and the Breda 4.7 per cent. Of these, Cogne is in an especially favourable position and no other Italian firm can compete with them in regard to quality. Their two blast furnaces remained undamaged and the close-by mines yield one of the best-known ores.

Conclusion

In 1946, actual figures of pig-iron production had fallen considerably short of the forecast, mainly through delays in starting up blast furnaces as a result of coal shortage due to United States mining and shipping strikes. Low production levels continued into 1947, output for January and February not exceeding 12,000 tons and 13,000 tons respectively. The downward trend in domestic output of pig-iron which began in October has, however, reached its turning point, and in March and April considerable progress has been made. Coal arrivals are higher than in the preceding months, more hydro-electric power is available and electric furnaces are now beginning to operate again. Provided that Italy can maintain the flow of coal imports, the grave situation which developed during 1946-47 should not arise again.

Institute of British Foundrymen

Belgium Revisited

Last week a party of forty members of the London Branch of the Institute of British Foundrymen visited a number of Belgian foundries. The arrangements were organised by Mr. Barrington Hooper, C.B.E., a past Branch-president, and Mr. F. Arnold Wilson, the honorary secretary.

Brussels

The first visit to be made was to Fonderies Nestor Martin, located in a suburb of Brussels. They are large-scale manufacturers of gas and electric cooking stoves. The foundry was mechanised some 12 or 15 years ago and has stood well the test of time. Owing to coke shortages, the production, which was of the order of 50 tons a day, is now down to 25 tons. A five-and-a-half day week of 48 hours is worked, but difficulty is encountered in getting piece-workers to leave at "clocking-out" time, as they are so anxious to augment their earnings, because there is so much they can buy with the extra money. As is well known, the shops are teeming with producer goods, from all parts of the world.

Production Slogans

As a number of visitors expressed interest in the slogans printed in French and Flemish on vitreous-enamelled sheets and placed at regular spacing along the walls of the foundry, a translation of their import is set out hereunder. They have been compiled with the object of reducing wasters. They read:—

(1) Never work with anything other than perfect material and tools.
(2) Use clean patterns.
(3) Well vent the moulds.
(4) Use blue sieves for decorative castings. ["Blue" sieves are those of specially fine mesh.]
(5) Use dry sand.
(6) Ram hard around the runners.
(7) Skim your ladles in the gangways.
(8) Cast with hot metal.
(9) Cast carefully.
(10) Don't waste hot metal.
(11) Avoid causing flash on castings.
(12) Break off runners with care.
(13) Go and examine any scrap you make.

Whilst these are excellent, there is still the problem of "freshness" to overcome. To use an Irishism they would, after all these years, only notice their presence if they were taken away. One of the problems of this foundry is the labour turnover. The normal staff of the foundry is of the order of 120 to 150, but so far this year no fewer than 800 have come and gone. The foundry has been sequestrated because of alleged collaboration during the occupation and perhaps there is not the same esprit de corps, which was particularly noticeable in other privately-owned concerns.

During the afternoon, the visitors were the guests of Fabrimetal—the employers' federation—for a visit to Waterloo and to a reception in the association's office. This was organised by Mr. De Keyser, the manager of the section covering foundry interests. In the evening, the officers of the Association Technique de Belgique and some associated personalities were the guests of the London Branch at a banquet—not an austerity dinner—at the Palace Hotel.

The next works to be visited was in the heart of the country at Selem, owned by Seneton Raemakers. Here, spanning the drive to the beflagged works, was a huge banner bearing the word "Welcome." It was no empty platitude as the reception given was the essence of cordiality. A "padre," the brother of the proprietor, who spoke English quite well, acted as spokesman for the management. From his remarks, it was learnt that the family had operated the foundry for three generations and each generation had in turn been mayor of the village. All the operatives were of local origin and most were still small holders. Arrangements were made to give leave of absence for the harvest and other similar agricultural needs. A great speciality of the foundry was the making of cast-iron windows; some for power stations and churches were of very considerable size. It reminded one a little of a pianoforte frame foundry. The art in avoidance of warp in such long, thin sections and there has obviously been close co-operation with the designers. The foundry was being expanded and the new bay is lofty and furnished with an overhead travelling crane. At the conclusion of the visit, visitors, staff and workpeople were all invited to gather round flower-decked tables to celebrate this unique event. The management were thanked on this and all occasions by Mr. G. W. Rowsham, the newly-elected vice-president of the London Branch, and Mr. René Deprez, the president of the Belgian Foundrymen's Association.

Liége

A belated arrival at Liége, coupled perhaps with the excessively hot weather, caused the cancellation of an organised sightseeing trip, but there was offered to the visitors a most delightful tea at which an opportunity was given to meet the British Consul and the leading personalities in the Belgian foundrymen's organisation. In the evening, the Association Technique de Fonderie de Belgique gave a banquet to the visitors; it was presided over by Mr. René Deprez, whose brilliant speech of welcome was splendidly interpreted by Mr. Commins, the English secretary of the Association. Mr. Rowsham replied, and after thanking the members, president and officers of the Association, the management and staffs of the Belgian works visited, Mr. Barrington Hooper and Mr. Arnold Wilson for their contributions to the success of the visit, apologised for the absence of the officers senior to him in the London Branch. He was pleased, however, to have the support of the President of the Institute, Mr. D. Howard Wood, and two past-presidents, Mr. V. C. Faulkner and Mr. J. W. Gardom. It was pleasing to note that since the liberation, no fewer than four members of the London Branch had given Papers before the Association in Liége. They were Mr. P. Fassotte, Mr. V. Delport, Mr. F. Hudson and Mr.

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Belgium Revisited

W. Braidwood. Other toasts were proposed by Mr. Wood and Mr. Léonard, a past-president of the Institute.

More Works Visits

The visit to Esperance Longdoz—still presided over by the seventy-five-year-old Mr. Varlet, an honorary member of the Institute—was extremely interesting. Here is the most renowned centre in Europe for seeing the art of loam moulding in operation. Mr. Varlet was amongst the first to demand from the engineer adequate plant at a time when the general rule was improvisation. He installed, some twelve years ago, well-equipped shower baths for the operatives. He has no shortage of labour. He was the first to use the heat from freshly-cast ingot moulds to dry the cores for use next day. Here there are practically no shortages, perhaps because the foundry is a department of an iron and steel works. Even soda-ash is plentiful. The coke is still good, but not quite of pre-war quality. Amongst export orders were water turbine castings being made for Sweden. It was a well-organised visit, limited to showing in every detail the manufacture of ingot moulds and rolls, mirrors being placed over a mould for a large casting so that the visitors could see the filling arrangements.

It was interesting to learn that the operatives had expressed a wish to have their luncheon hour postponed in order to free the canteen for the entertainment of the guests. The labour-employer relations were stated to be excellent.

"Go-Slow" Reaction

The final visit was to the famous works of Cockerell, of Seraing, which operates iron, steel and non-ferrous foundries. Here was heard the only complaint as to labour efficiency. During the war, as is well known, the B.B.C. was constantly broadcasting advice to the workpeople of occupied Europe to go slow. The result of this is that, whilst the older employees have recovered pre-war speed, the younger ones have found it difficult to eradicate the bad habits formed. Of especial interest to London founders was the exhibition of particularly large cast-iron crankshafts.

The four ladies of the party were, during the period of this visit, the guests of Mr. Charles Monseur, who placed his car at their disposal for a visit to the Ardennes forest.

A major advantage of this visit to Belgium was the opportunities afforded for informal discussion on economic and foundry problems between host and guest, the latter returning home still wondering why such abundance exists in Belgium and such a paucity in Great Britain.

Dr. J. C. Hudson, of the British Iron and Steel Research Association, is lecturing to the "Association Belge pour l'Etude, l'Essai et l'Emploi des Materiaux" next Wednesday on the steps being taken by the British to combat corrosion. Some £12,000 a year is being expended on this research.

Publications Received

Experimental Science—A Career for the Practical Boy or Girl. Published by the Institute of Physics, 47, Belgrave Square, London, S.W.1.

This 20-page, well-illustrated, booklet is written with the object of attracting youth into the field of physical research and process control. A mistake (now unfortunately becoming more common) has been made in talking about salaries. Youths, and indeed many grown-ups, do not appreciate £600 to £700 a year; they only require to be interested in the early stages.

A Memorandum on Lighting in Industry. Prepared by the Lighting Service Bureau, 2, Savoy Hill, London, W.C.2.

There are but few grumbles about the illumination of foundries, as this industry was amongst the pioneers of better conditions. There is, however, a danger in being a pioneer—a tendency to rest on one's laurels. Thus it is necessary to impress on foundry executives the fact that the means of illumination are not static and that advantage must be taken of new developments, such as the reduction of shadows and so forth. This memorandum sets forth in plain English the statutory requirements and follows up this with sections on the principles of good lighting; a review of present factory lighting standards and practices and lighting recommendations. Including the appendices, there are but 14 pages of letterpress, yet no essential has been omitted. In addition there are six pages of well-chosen illustrations. Executives who are really interested in illumination problems can obtain a copy by writing to Savoy Hill.

Report on German Blast Furnace Practice and Plant. Published by the British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1. Price 10s. 6d.

This is an excellent publication. It is the conjoint effort of the various investigators sent to Germany under Government auspices since hostilities ceased, and very largely "debunks" the notion of German scientific pre-eminence. Germany has been, ever since the invention of Gilchrist, much in the debt of the British, for both plant and process development. One direction in which progress has been noted is in the case of carbon linings for the hearth and bosh. Those of our readers interested in blast furnace practice will find this 60-page publication of real value.

Ceramics as Engineering Materials by F. Singer, Ph.D., and H. Thurnauer, M.Sc. This is a reprint of an article which originally appeared in "Engineering Materials" and gives information on a range of ceramics in a form which will be appreciated by those whose job it is to incorporate such materials in engineering assemblies.

B.I.S.R.A. . . . . Projects

The following is a factual summary of the activities on which the British Iron and Steel Research Association is engaged. It will be appreciated that, although this work extends from blast furnace to rolling mill and draw bench, it is but a fraction of the total research work being carried out by the industry as a whole. The work in progress on blast furnace burdens is directed towards obtaining knowledge of the best conditions and proportions of the constituents of the burden and the best methods of obtaining these in practice. A survey has been completed of present practice in preparation of raw materials as a preliminary to detailed study of crushing, screening and handling problems. In particular, work has been commenced on the behaviour of foreign ores on crushing, and on the specification of optimum size of various ores.

Experimental work on a full scale sinter plant has been begun, with the object of introducing improvements suggested by previous laboratory and intermediate scale work. Small scale experimental work on sintering has continued in the laboratory with particular reference to the assessment and control of chemical and physical properties in the sinters. In connection with the actual processes at work inside the blast furnace, model work has continued on the distribution of materials. Particular attention has been paid to the influence of methods of practice and furnace construction on distribution.

Experiments on the penetration of heat and gas into lump ore have been begun, using a variety of ores, cut to geometrical shapes of different sizes. These experiments are being made to assist in determining the optimum size of various ores. The baby blast furnace at Shelton is used, of course, in connection with these investigations and we believe it to be the smallest furnace in the world actually making iron. A survey of present blast furnace practice in this country is being made and up-to-date information is being collected about furnace lines and dimensions, equipment and layout. The information obtained by correlation of these data will form a starting point for statistical work on operating practice.

A series of recommended procedures has been prepared for special operation, such as shutting down, isolating and blowing out blast furnaces and has been circulated to operating staffs in the industry. Coke quality is a subject very much under discussion just now, and a conference has just been held to discuss it, in co-operation with the British Coke Research Association. On blast furnaces refractories, a conference has discussed the use of carbon hearths. Scaffold formation is being studied and blown out furnaces are examined as opportunity offers.

At the steelmaking stage, primary interest is in furnace design and control and the chemistry of the steelmaking process. The work in furnace design is centred in the experimental O.H. at Shelton, of which there was a report in the March Journal of the I.S.I. There has been much work on instrument control. The development and application of an instrument for measuring flame quality, on either oil or gas fired furnaces, is another project now under way. Steady work is being carried on, both practically and fundamentally, on the subject of pyrometry. On the chemistry side of steelmaking, a general investigation is proceeding on the behaviour of sulphur in the O.H. furnace. This again is being tackled from both practical and fundamental angles.

Ingots and ingot moulds are both subjects of investigation, these being long standing projects transferred from the Research Council of the B.I.S.F. Comparisons of ingot moulds of various analyses are being made and other projects include work on mould design and mould dressings. The determination of the gaseous content of steel in liquid and solid states and their relations to steel quality is the subject of present work. On steel making refractories work is carried out in alliance with the British Refractories Research Association and a programme of research on gas producers has been worked out in conjunction with the British Coal Utilisation Research Association.

On the subject of steel manipulation and workings, there are three main lines of interest. These are coating, rolling and drawing researches. Work on coatings will shortly be capable of considerable expansion when the new B.I.S.R.A. laboratories at Sketty Hall, Swansea, are in full operation. Meanwhile work goes forward on the distribution and thickness of tin and zinc coatings and further projects, on the porosity of tinplate and the geometrical characteristics of metal surfaces, are already begun.

Steel Foundry Practice

Work in connection with castings can also be considered under three main heads:—melting; foundry operations; moulding and refractory materials. On melting, the side blown converter has received most attention and much basic information is available. This latter process is being studied further, in particular, by the spectroscopic examination of the converter flame, with a view to obtaining fundamental data as to the course of the blow and also with a view to producing an improved method of control for the process. The work to date has shown variations in intensity of lines and bands associated with manganese and manganese oxide, as noted previously by other workers and an instrument is being designed capable of recording the changes.

A series of tests of the fluidity of steel melted by various types of furnace is being undertaken and laboratory experiments are being made with the object of devising an alternative test to the fluidity spiral, more suited for use under foundry conditions. A series of researches is also proceeding on the freezing of

B.I.S.R.A. Projects

steel, which range from theoretical investigations of the mechanism of freezing, to practical methods for preventing defects in castings that may arise during the setting of the steel, such as "burning on" and "hot tearing."

The whole field of the non-destructive testings of castings is receiving considerable attention and comparative tests, with X-ray, Gamma-ray and supersonic methods, indicate that the latter method, whilst being largely in a development stage in regard to its application to castings, shows great promise. Another aspect of foundry operation which is being studied is silicosis in foundries, in which the Pathology Dept. of the University of Sheffield is co-operating with experiments on white rats, probably newcomers to the steel game. Some preliminary measurements of the concentration of dust particles in the atmosphere at various points in a foundry have been made and this work is being greatly extended.

Study on moulding and refractory materials is being carried out, and an apparently non-toxic moulding material is being exhaustively tested in practice, while work also goes forward on eliminating or reducing the need for linseed oil. A variety of materials used for monolithic converter linings is undergoing comparative trials with a view to establishing the properties required to give a satisfactory monolithic lining.

Hair-line Cracks

The recent publication, "The Removal of Hydrogen from Steel," gives a line on the work that has been put into the study of hair line cracks and this has reached the stage where preventive methods are being studied in works practice. Non-metallic inclusions and the detailed study of the physical properties of a whole series of alloy steels are other projects, which are receiving attention. Recent work at the N.P.L. on the determination of the physical constants of a number of alloy steels is reported in "The Physical Properties of a Series of Steels—Part II" in the Journal of the I.S.I. for last September.

On the subject of the examination of methods of analysis, work is going forward under five main heads; blast furnace raw materials; pig iron, carbon and low alloy steels; other steels; spectrographic methods; physico-chemical methods. The last-named project covers investigation of absorptiometric methods, etc.

An organisation is being built up for the study of metal physics and work on the iron-nitrogen and iron-carbon-nitrogen systems is in progress. Another comparatively new development is the organisation of a "new techniques committee," whose task is concerned with the development of essentially new techniques for laboratory and works examination of the properties and behaviour of iron and steel in the solid state. So far study goes forward in four main directions; on mechanical methods, on magnetic and electric methods, on X-ray and diffractions methods and on optical methods. A great deal of work has also been done on brittle fracture, a subject also of considerable attention in the United States.

The ever-present subject of corrosion is, of course, still the object of much attention, which it is not easy to summarise. Inhibitive action of various substances; tests on the corrosion fatigue life of steel; exposure tests on protective coatings; study of the effects of low alloy addition are some of the obvious main lines on which work is taking place.

Physical and Chemistry Organisations

This department is now installed in new laboratories in Battersea which it is hoped will be in full operation this summer. A good deal of construction work is still in progress, but the work of the department is well in hand.

The three main functions of the Physics Department are:—

(1) To keep in touch with the advance of physical science with a view to possible application in the iron and steel industry.

(2) To carry out research into the more fundamental physical problems connected with the work of the Association.

(3) To carry out on behalf of the Divisions, research and development in fields of physics which are common to more than one Division.

It has been found valuable to set up five Sections each of which is primarily responsible for one part of the work of the Department.

(i) General physics, concerned with the measuring and theoretical interpretation of the physical properties of iron and steel in the liquid state, during the freezing process and in the temperature range from freezing to atmospheric.

(ii) Instruments, with two-fold function of carrying out research into the development of new instruments for the investigation and control of processes in the steel industry and assisting in the supply and application of instruments whose design is already complete.

(iii) Heat and thermodynamics, working especially on the investigation of the processes of heat flow and heat liberation, radiation from solids and flames.

(iv) Aerodynamics, investigating the fundamental laws governing the flow and distribution of gases in furnace systems and also the dynamics of flow of liquid steel.

(v) Mathematics and theoretical physics, seeking to provide a fundamental theoretical background for the work of all the other four sections and the divisions, in order to ensure that this work is applied over as wide a field as possible and is not confined empirically to the particular cases investigated.

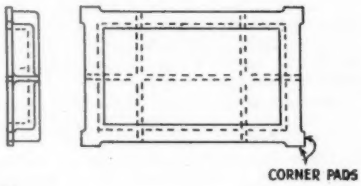
Other projects at present being investigated in the Instrument Section include: Application of lead sulphide photo-sensitive semi-conductor cells to low temperature radiation pyrometry (150-600 deg. C.); indication of proper point of termination of the blow in side blown converters from examination of the flame spectral characteristics; development of a remote indicating open hearth roof pressure meter: development of an instrument for measurement of the profile of wire drawing dies.

Additions to Metal Coreboxes

By "Checker"

Simple additions could often be cast on metal coreboxes, which can be extremely useful to both patternmaker and coremaker. Fig. 1 shows the top and side view of a shallow metal corebox frame, which has small filing pad extensions at each corner as shown. These extensions need only protrude $\frac{1}{16}$ in. to $\frac{1}{8}$ in. from the outside shape, their length varying from $\frac{1}{2}$ in. to $\frac{1}{4}$ in. according to the corebox size. These additions are extremely useful when the corebox frame has to be squared at one end and side, for the production of centre lines in their true relationship to each other, prior to fixing the inside portion to give internal shapes

FIG. 1.



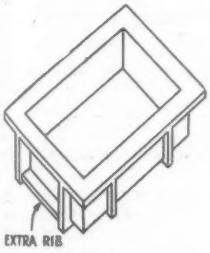


FIG. 2.

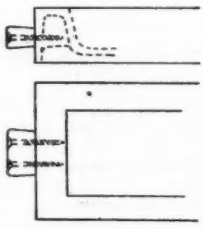


FIG. 3.

corresponding with these centre lines. They eliminate any necessity for machining corebox sides the full distance, for these pads can easily and accurately be filed square to each other. The desired result is quickly obtained through the small surfaces of the pads cutting all necessary filing or machining to a minimum.

Another useful addition which can be incorporated on many metal coreboxes is an extra rib at each end of the corebox; these ribs (see Fig. 2) are used for assisting the coremaker when withdrawing the corebox from the core, their purpose being to form a simple but effective ledge which gives a convenient hand-hold when lifting. These ribs can generally be made loose on the

(Continued at foot of next column)

New Catalogues

Ferrous and Non-ferrous Castings. We have received from Victor Moyle & Company, 38, Park Road, Hampton Wick, Kingston-on-Thames, a four-page leaflet, in which are listed the specifications of 21 aluminium alloys, 14 copper base alloys and 5 cast irons; where possible these are correlated with national specifications. Use should have been made of the last page or a smaller format employed. A useful telephone wall chart was also received.

Foundry and Engineering Products.—We have received from David Brown & Sons (Huddersfield), Limited, Park Gear Works, Huddersfield, three business publications. The brightest and best is that covering the products and activities of the parent and subsidiary companies. Good use has been made of colour, but on many pages there is a block of type broken up by black blobs, which it is suggested could be improved by the changing of their colour of the headlines or by resetting in some other form. Otherwise this is excellent. The second one, dealing with alloy and carbon steel castings, is marred by the too heavy use of red, which masks the all-important black pictures. Full marks, however, must be accorded for both letterpress and photography. The third one, which is a more modest publication covering spiral bevel units, has the best cover of all. It has used blue to good advantage, but the reviewer believes that the black and white prints would have shown better as blue prints. These criticisms of really high grade publications are made, it is hoped, with the object of raising the already high standard of engineering trade literature.

Light Alloy Castings. Issued under the title "Birmal Data," Birmingham Aluminium Castings (1903) Company, Limited, Dartmouth Road, Smethwick, have produced an attractive booklet designed to help the engineer to select the best alloy for the job. Co-operation in the design stage is rightly urged in the introduction. In 26 pages a mass of data is presented covering sand, gravity die cast and pressure die cast castings in both aluminium and magnesium with zinc entering into the last category. The publicity department of this pioneer firm in the light alloy casting industry is to be commended on this booklet realising the restrictions imposed on their efforts by the controls of to-day.

(Continued from previous column)

master patterns, thus eliminating the necessity for a core at both ends.

When the outside shape of metal coreboxes prohibit cast on extensions for lifting purposes, additions can be cast separately, and screwed into position after the inside corebox shapes have been completed, as shown in Fig. 3. Care must be taken to provide on the master patterns sufficient extra metal for the tapped holes when fixing with screws, if the usual wall thicknesses are considered too thin.

E

Book Reviews

"Workshop Engineering Calculations and Technical Science," Vol. I, by J. Stoney. Published by the English Universities' Press, St. Paul's House, Warwick Square, London, E.C.4. Price 10s. 6d.

As a text book for students in Junior Technical Schools, this volume has its uses, as there is sufficient subject matter to interest a young student and many of the examples set are of a practical and useful nature. The book should prove of value, too, to any craftsman who wants to revise his mathematics and general science. Physicists, however, will almost certainly take exception to the definition of "density" on page 90 and will, no doubt, prefer the correct version:—Mass per unit volume. Mass and weight are, by no means, the same thing. In the section on "Decimal Fractions," dealing with micrometer calipers, mention might well have been made of the micrometer screw-gauge ("screw-gauge" is preferable to "caliper"), furnished with a vernier to read to one ten-thousandth part of an inch. Such instruments are normally encountered in the workshop. The load-extension curve (page 115) looks strange to one, who has taught, for years, the subject of "Strength of Materials" and always used the accepted method of plotting loads vertically and extensions horizontally. Why the sudden change?

W. G. B.

Laboratory Manual in Metallography, by John F. Eckel, D.Sc., and Robert J. Randebaugh, Ph.D. Published by McGraw, Hill Publishing Company, Limited, Aldwych House, London, W.C.2. Price 22s. 6d. net.

This is a most interesting manual and in many ways unique. Its purpose is to guide students and others in the correct way of assessing and recording the results of their practical work. The forty-two chapters and three appendices deal with almost every conceivable feature likely to be encountered in practical metallography. Unfilled data sheets and graph paper for the student to fill in himself greatly enhance its value. The general principles of practical metallography, such as the use of the microscope, polishing technique and photographic principles, are ably dealt with, in addition to special chapters given to particular alloy systems, including non-ferrous alloys, steels and cast iron. To give an idea of the all-embracing qualities of this work, reference might be made to some of the chapters on the many special subjects, such as products of powder metallurgy, the Jominy hardenability test, age-hardening, etc. These and many other unusual features greatly add to the value and interest of this publication. To derive the full benefit from such a work, a student should be familiar with the general principles of metallography. Not only should this book be of value to the student, but equally so to the teacher in guiding him in the methodical methods to be pursued in the teaching of practical metallography.

J. H. ANDREW.

House Organs

The Whiting Founder. Spring, 1947. Published by the Whiting Corporation, Harvey, Ill., U.S.A.

This issue carries an illustrated description of the mechanised melting department of the Auto Specialties Manufacturing Company, of St. Josephs, Michigan. It uses hot blast cupolas and moisture control apparatus.

Foundry Practice (Jan.-Feb., 1947), house organ of Foundry Services, Limited, of Long Acre, Nechells, Birmingham, 7, gives more details on the use of asbestos in the foundry, an inquest into the failure of an aluminium bronze die casting and the use of briquettes in iron foundry practice.

C.F.A. Bulletin for April. Issued from Derbyshire House, Belgrove Street, London, W.C.1.

This issue details the new list of priorities, and carries information about apprenticeships interrupted by call-up to the Forces. Much information is given about films in industry and the conditions governing the application for scholarships to the Metallurgical Department of Birmingham University are set out. Finally, there is a note on the interim report of the economic situation, published by the Federation of British Industries.

Malleable Iron Facts. No. 27. Published by the Malleable Founders' Society, Union Commerce Building, Cleveland, Ohio.

There is a real appreciation of the art of publicity in this issue, which deals with fatigue strength, as witness this tabulation summarising the argument:—

	Competitive material.	Malleable iron.
U.T.S.	70,000 lb. per sq. in.	55,000 lb. per sq. in.
Notch fatigue strength	14,000 ,, ,,	18,833 ,, ,,
Section required for 28,000 lb. load ..	2	1.5 sq. in.
Saving in weight ..	—	25 per cent.

It is to be noted that the name of the competitive material is not publicised.

The Stantonian, March 1947. This particular issue is entirely devoted to the internal affairs of the organisation and reveals the extensive activities undertaken ranging from art exhibitions to cricket and football.

Council of Ironfoundry Associations. Derbyshire House, Belgrove Street, London, W.C.1. **Service Bulletin No. 14.**

This is a continuation of the report started in Bulletin No. 13 on Training within Industry and specifically deals with the Job Relations Programme. It also contains a note on Industrial Health Services for small firms.

"Contact," Vol. 7, No. 4. The house organ of the David Brown Organisation.

This is quite a sizeable publication running to 48 pages and cover, yet for the most part it is confined to happenings in the works. Here and there, however, are simple technological articles, the whole making a well-balanced production. The illustrations are uniformly good and the practice of separating purely local gossip to its own section is to be commended.

Copper Uncertainty

By "Onlooker"

It is one of the less satisfactory aspects of the system of bulk purchasing that so much has to be done behind the scenes, the periodic statements which are published being for the most part bald and uninformative. No doubt this is inevitable in the circumstances, but that does not make it any more pleasing and many people are, by now, convinced that we shall make little progress towards a better state of affairs until we change our tactics. Since no news is not *always* good news, it follows that conjecture tends to assume a somewhat gloomy complexion and bits and pieces of information and gossip are linked together to form a whole, which is, often enough, far from the truth. In fact, rumour flourishes in a manner never seen in the days of the open market when people could, and did, press for the facts, which could usually be obtained, if not in one direction, then in another. We have, it is true, access to all the facts of the American market situation and, so far as metals are concerned, it is New York which sets the level of values for the rest of the world to copy. We have also the guidance given by the trend of stock exchange prices in London as well as the comments on mining matters and commodities in the daily Press. The inescapable fact is that the key to the puzzle of future events is in the hands of the Government and it is to them we must look eventually for news and information.

One of these imponderables, at present, is the vexed question of hard currencies in general and of dollars in particular. The great world shortage is of U.S. currency, but in regard to metals—and a number of other commodities, too—we, in Britain, are much concerned about Canadian dollars, or rather the lack of them. The Dominion in turn has its own troubles and a need to export as much as possible to the United States in order to secure U.S. dollar credits. So far as non-ferrous metals are concerned, this currency conundrum centres mainly round copper, but it must not be forgotten that, from Canada at any rate, come also nickel, aluminium, lead and zinc. With regard to the last two, these are also mined extensively in Australia and bauxite, the ore of aluminium, is widely distributed, its treatment depending mainly on the availability of cheap electric power. As to the tonnage of copper coming from the Dominion to the U.K., this seems to be running at about 6,000 tons monthly, or should be at any rate and much of it is in the specialist class, *i.e.*, consisting of H.C. cakes, billets, wire rods, etc. The lead and zinc are of first class quality. From the United States refineries we derive very little copper, apart from the product of the conversion contract, for America is an importer of this metal on balance. But the output of the great Chilean mines interests us very much and for this we have to pay in U.S. dollars as these properties are American owned. Before the war we imported something like half of our copper from countries which to-day are reckoned as hard currency and since our usage in 1946 was 325,000 tons, a peacetime record, it is pretty obvious that we cannot dispense with any source of supply without industrial activity suffering.

Mr. Dalton's Budget proposals were an obvious warning to everyone interested in dollar imports and the Chancellor has reinforced his remarks since by hints of more restrictions in the near future. In the circumstances and bearing in mind the secrecy complex of the Ministry over supply matters, it is not remarkable that rumours have been current of a rationing scheme for copper. Perhaps thoughts have turned more readily in this direction because of the precedent established by lead, which has been subject to rationing since January last year and shows no sign of getting back to normal, although the supply position in the States is improved. Examined dispassionately there does not seem to be anything in the outlook at the moment suggesting that the supply situation is any worse than it was, say, six months ago. Stocks are probably not much below the 100,000 ton level, and so far as is known shipments are coming forward in a normal manner. This rumour looks more like an attack of nerves than anything else, for the dollar crisis, although looming ominously, is not upon us yet. In any case nothing can be known until the Cabinet has reached a decision about the priorities which will be allocated in respect of the various commodities required in this country, which are of hard currency origin. The rationing of lead has not proved by any means easy, but it is a straightforward job in comparison with copper, where there are a number of different qualities, as well as a variety of shapes. It may be that circumstances will compel the Ministry to cut the amount of copper brought to this country, especially if the trade continues to absorb metal at its present rate. But such a measure would not be easy to operate and its effect upon other industries depending upon copper and its alloys in the semi-fabricated form might well be disastrous. All things considered, it seems doubtful whether these somewhat vague suggestions of the need to ration copper have much, if any, basis of truth in them. In any case, there is no guarantee that demand for the metal will continue at the present rate; already in the States there are signs that things are past the best.

Institute of Metallurgists

Examinations for the Licentiateship and Associateship of the Institution of Metallurgists will be held during the week commencing September 7, 1947, in London and other centres to be decided upon when the number of candidates in different areas is known. Application for permission to enter for the examination should be made not later than June 14, 1947, on forms to be obtained, with copies of the regulations from the Registrar, The Institution of Metallurgists, 4, Grosvenor Gardens, London, S.W.1. Full details of the arrangements for the examinations and instructions as to payment of fees, will be sent to those whose applications are accepted, before the end of June for completion and return with the appropriate fee.

Vickers' Return to Commercial Work

Shortage of Labour and Materials

Their main problem in 1946 had continued to be the replacement of their armament work by commercial productions, and if they remembered that their own specialised commercial products were few in number they had achieved greater success than might have been anticipated, said Sir Archibald A. Jamieson, chairman of Vickers, Limited, at the recent annual meeting of the company. It was an indication of the extent of this conversion that whereas the works were wholly employed on armament work at the end of the war, analysis of productive wages revealed that for the last month of 1946 the expenditure on commercial work was about 80 per cent. of the total. In addition to expanding their commercial activities it was their policy to maintain their specialised capacity for the wide range of armaments for which the company had built up a world-wide reputation.

Sir Archibald said that in their efforts to carry through this change-over to commercial work, they had had disappointments and difficulties. First, there was an inadequacy in numbers of certain types of labour. Secondly, they were suffering from an acute shortage of many materials, and only recently their steel allocation for shipbuilding and other purposes had been reduced seriously. Thirdly, they had had rising costs, which shook the confidence of their customers and contributed to the general feeling of insecurity both at home and in the export markets of the world. Fourthly, there had been unavoidable delay in carrying out their programme of modernisation and re-equipment.

Modernisation of Shipyards

The shipyards at Barrow and Newcastle, besides being modernised in every possible way, were being modified and re-equipped to allow of the introduction of welding and pre-fabrication on a large scale, with the appropriate modifications to cranes, etc., to enable large prefabricated sections to be handled in the shops and on the berths. In their engineering works they had been involved in a considerable amount of rebuilding and restoration, and the rearrangement of plant to deal effectively with the large volume of commercial orders which had been secured.

Referring to the progress of subsidiary and associated companies, Sir Archibald Jamieson said that during 1946 the whole output of the Palmers Hebburn Company, Limited, had been devoted to civil production. The dry dock had been fully occupied and was booked well ahead, as also were the shiprepairing facilities. The constructional steel department continued to have a full order-book. The closure of certain departments of the English Steel Corporation, Limited, foreshadowed last year, had been effected, and during the year the company's production was, with the exception of a few armour plates to complete old contracts and some experimental work, wholly of a commercial nature. Firth-Vickers Stainless Steels, Limited, had a full order-book for 1947. An extension scheme costing more than £1,000,000 had been approved.

"If we are given adequate raw materials and reasonable supplies of our other requirements, we have at our disposal the necessary skill and craftsmanship in our management and workpeople, and the necessary cash to make a very solid contribution to the export markets and the essential requirements of the home market, but at the present time there is every indication that supplies will be inadequate for our requirements," Sir Archibald said.

Effects of Taxation on Production

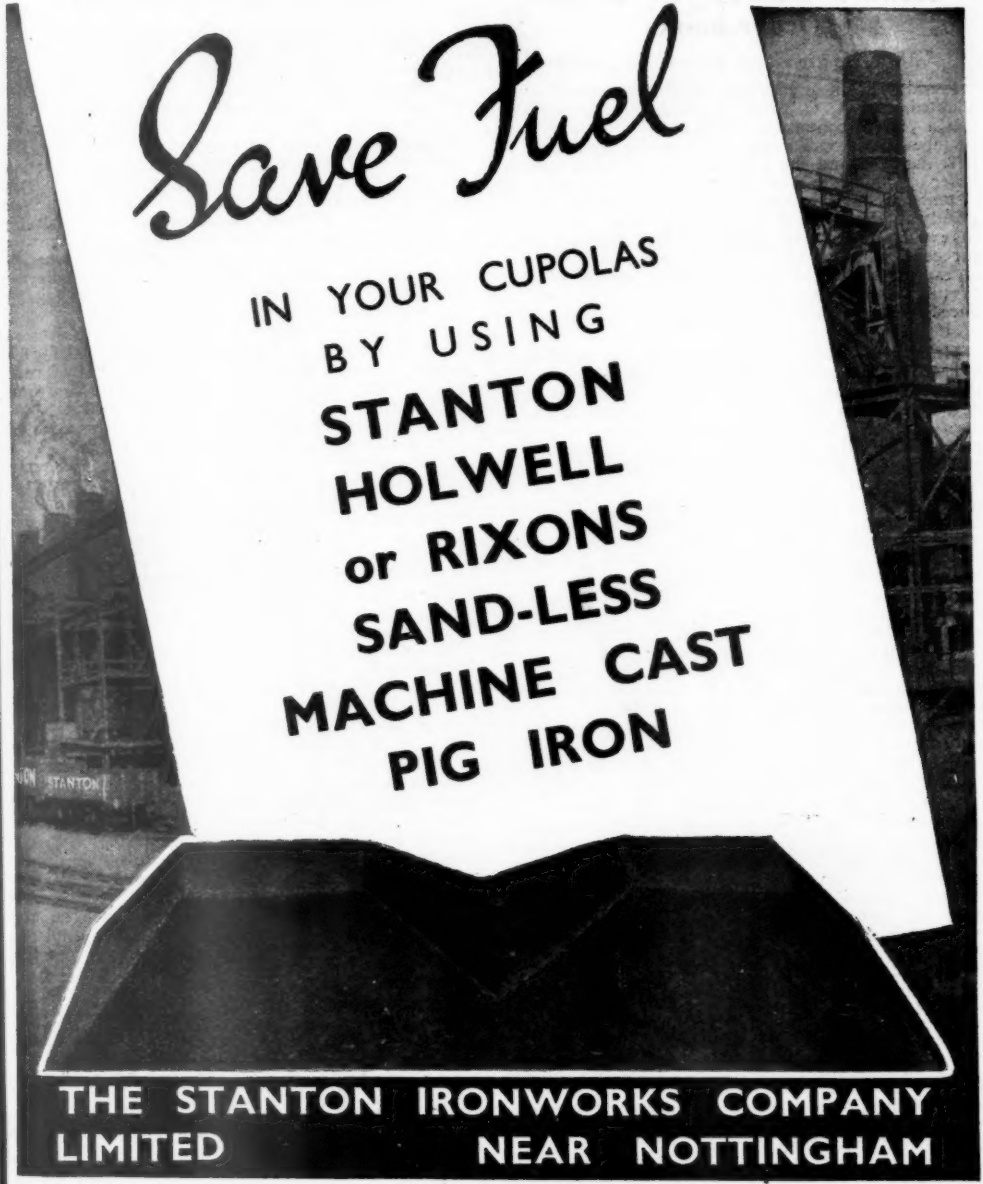
Engineering Industries' Views

A statement issued by the Engineering Industries Association points out that the provisions of the Finance Bill are not such as to give the engineering industry the encouragement for which they had hoped and which had been sought through representative associations. The deterrent effect of high taxation upon production and efficiency, so forcefully emphasised in many quarters during past months, had been ignored by the Chancellor in his determination to extract maximum taxation from industry. The bold policy which was forecast by the present Chancellor, and by his predecessor, is strangely lacking in a budget which seeks to defeat inflation by means which may well cripple the nation's productive output and economic life.

The retention of the standard rate of tax at 9s. in the £1, the continuation of the profits tax with its vicious increase to 12½ per cent. on distributed profits, and the new tax at 10 per cent. on bonus issues, all represent undisguised attacks on the profit motive which augur ill in a community which has founded its destiny on the enterprise and initiative of its members, the statement continues. "It is typical of the reckless and anomalous nature of the new legislation that the full burden of the augmented profits tax on distributions should fall upon the profits available to the equity shareholder, whose capital is the financial life-blood of industry, and who provides funds for research and development into new and extended fields," it is added.

Scottish Manufactures

The progress Scotland is making in the establishment of the lighter industries will be featured at an exhibition to be held in the Royal Scottish Museum, Edinburgh, from August 25 to September 30. Entitled "Enterprise Scotland, 1947," it follows an historical motif: "Scotland Yesterday," a symbolic treatment of the culture, crafts and traditions of the past; "The Country," displaying to visitors from abroad the natural beauties of Scotland; "Scotland To-day," displaying everything from ships to tartans; and "Scotland To-morrow," the plans and ambitions for the future. Information concerning the exhibition will be provided on application to the Royal Scottish Museum, Chambers Street, Edinburgh.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Stewarts and Lloyds' Record Order-books

Modernisation and Extensions Planned

Presiding at the annual meeting of Stewarts and Lloyds, Limited, Mr. A. G. Stewart, the chairman, said 1946 was a year of continuous heavy demand for all classes of tubes, pipes and fittings, both in the home and export markets, and the total tonnage of tubes now on order amounted to over 400,000 tons—a record in the history of the company. The export demand was greatly in excess of their ability to supply. Deliveries to export markets exceeded the 1938 tonnage by 24 per cent. During 1947 further substantial reductions in exports had been ordered. The permitted export of tubes during the second quarter of 1947 was reduced by 40 per cent. as compared with the last quarter of 1946.

Mr. Stewart said that their policy of continuous modernisation and improvement was again getting into its stride after the hiatus of the war years, and today, apart from any schemes for expanding capacity, over £2,000,000 was in process of being spent on improving the efficiency of their existing capacity. In addition, good progress had been made on what might be described as their 1944 extension plan, which was reported at the annual meeting in 1945. It had, however, become evident that still further extensions would be necessary if they were to meet the demand for their tubular products, particularly in the export markets. A further plan was, therefore, evolved to meet the new conditions. It was decided to include in this plan provision for the production of some 400,000 tons of billets as a contribution to the national shortage of semi-finished steel. The major extensions were scheduled to take place at Corby and in Scotland, and the overall effect would be to double their pre-war tube capacity and more than double their pre-war steel capacity. The proposals had been welcomed by the Iron and Steel Board and the difficulties of immediate and practical development were largely due to the general shortages with which they were faced.

On the question of nationalisation, Mr. Stewart said he felt more strongly than ever that it would be against the national interests, and the interests of the industry, to handicap them at this stage with any further form of Government control. They were faced with a most intricate problem in planning for the very large increase of their tube and steel output, and he was quite certain that if the Government were to take over the industry, or part of the industry, the changed control and the re-examination of the plans already so carefully evolved, could only lead to serious delays in the carrying out of these vast schemes.

J. B. MACDERMOTT, LIMITED, 40, West Nile Street, Glasgow, have been appointed by the Fullers' Earth Union, Limited, as sales agents in Scotland and Northern Ireland for all foundry bonding materials sold under the registered trade name of "Fulbond."

Scottish Industrial Survey

A White Paper surveying Scottish industry and employment entitled "Industry and Employment in Scotland," which was published last week, is intended to supplement the "Economic Survey for 1947" by providing in detail the facts about the Scottish industrial situation. Although more insured workers were in employment in the Development Areas in July, 1946, than in 1939, unemployment is shown to have risen sharply since the end of the war, from 20,000 to 94,000 in February, 1947; it remains a long way below the 1939 level of 172,000. Some of the basic industries, such as coal mining, foundries, and agriculture, are short of skilled men and men fit for heavy work, but there are also considerable problems of unemployment among men not suitable for these industries but fully suitable for others.

On the basis of previous output, Scotland's share of the British target of 200,000,000 tons of coal for 1947 would be over 24,000,000 tons. Eventually Scottish annual output must reach 30,000,000 tons. Already man-power has risen from 79,100 in 1946 to 80,000. A start has been made with the development of the great new coal-mining areas in Fife.

The steel industry's plan is to raise the present annual output rate of 1.82 million ingot tons to 2.2 million tons. Schemes of reconditioning and modernisation costing £2,500,000 are in hand. Great progress has been made in building up the labour force of the industry, which almost reaches pre-war, though there are still 1,000 vacancies. Improvements in conditions, mechanisation of foundries, and training of unskilled workers for skilled occupations are among the measures being taken.

The White Paper states that the chief difficulty which is confronting the engineering industry is shortage of raw materials, particularly iron and steel. Owing to the fuel crisis, supplies are likely to be less in the first half of 1947 than in the latter part of 1946.

The problems confronting Scotland are summarised as follow:—(1) Those common to the United Kingdom as a whole—namely, the shortages of basic materials and the consequent need to raise output, particularly in the basic industries, as a means of improving our standard of life; (2) the special problem of providing more industry and more employment especially for men in certain areas. It is stated that on an increased output of coal, steel, foundry products, and building materials depend not only the whole standard of life of the British, including the Scottish people, but also the building of new factories and the increasing of employment in existing factories.

"Industry and Employment in Scotland" is published by H.M. Stationery Office, Edinburgh, price 2s.

TO MARK THEIR CENTENARY, which is being celebrated this year, the directors of Shaw & McInnes, Limited, ironfounders and cast-iron pipe manufacturers, of Glasgow, have given a new clubhouse to the company's welfare club.

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News in Brief

AN OFFER FOR SALE of 416,080 shares of 1s. each at 18s. per share in the Midland Iron & Hardware Company (Cradley Heath), Limited, is to be made shortly.

THE WEAR WINCH & FOUNDRY COMPANY, LIMITED, are to transfer their business from Park Lane, Sunderland, to an extensive new factory adjacent to Spelter Works Road, Sunderland.

WORK HAS BEEN STARTED on the £100,000 extension to the Banner Lane Works, Coventry, of A. C. Wickman, Limited, machine-tool specialists. The extension will provide an additional 40,500 sq. ft. of floor space.

THEIR ORDER-BOOK was the largest in the history of the company, said Mr. G. Leslie Wates, chairman and joint managing director of Johnson & Phillips, Limited, presiding at the recent annual meeting. Shortages of material and labour had been such that there had been no possibility of accelerating output to keep pace with the increasing volume of business being offered.

SUBSTANTIAL PRICE REDUCTIONS in certain forms of Nimonic high-temperature alloy have been announced by the manufacturers, Henry Wiggin & Company, Limited. That of machined bar in Nimonic "80," used by manufacturers of turbine blade forgings, is of the order of 15 per cent., and similar reductions have been made in the prices of smaller sizes of forged section supplied for machining.

THE GLACIER METAL COMPANY, LIMITED, announce that they have taken new and permanent premises in Kilmarnock. Their new address is the Glacier Metal Company, Limited, No. 3 Factory, Kilmarnock (telephone, Kilmarnock 1955; telegrams, "Metal, Kilmarnock"). Any goods rail traffic to the company should be consigned to the L.M.S. Goods Station, Kilmarnock. The change has been effective from May 26.

EXTENSIVE ALTERATIONS are being carried out at the Southwick Works, Sunderland, of George Clark (1938), Limited. The alterations will facilitate the more economical production of Diesel marine engines of 800 to 2,000 h.p. The changes are being made following an arrangement made recently by George Clark (1938), Limited, the North Eastern Marine Engineering Company (1938), Limited, and Richardsons Westgarth & Company, Limited. The North Eastern Marine Engineering Company are continuing the making of steam engines, while Richardsons Westgarth are concentrating on turbines.

SPEAKING AT BELFAST last week, Sir Frederick Rebbeck, chairman and managing director of Harland & Wolff, Limited, criticised the Government's decision not to include shipbuilding in the first six industries to receive priority supplies of steel. Steel was the life-blood of the shipbuilding industry, he said. The situation to-day was a nightmare and was likely to become rapidly worse. This was a time when the Government was crying out for more exports. People were told to work hard to produce exports, but what was the good if they could not get them out of the country because there were not sufficient ships?

Personal

LT.-COL. S. C. GUILLAN has been appointed secretary of the Institute of Metals and editor of its publications. He will take up his duties with effect from July 1.

MR. HARRY W. WYLD, manufacturer of small forgings and pressings, of West Bromwich, has been appointed chairman of the West Bromwich and District Manufacturers' Association.

PROF. LESLIE AITCHISON, professor of industrial metallurgy in Birmingham University, has been awarded the Royal Aeronautical Society's Simms gold medal for his Paper "Aeronautics and the Metallurgist."

LORD SIMON OF WYTHENSHAWE has been appointed chairman and governor of the British Broadcasting Corporation. He is governing director of Simon-Carves, Limited, and of Henry Simon, Limited, of Cheadle Heath, Stockport.

MR. NEVILLE LONGMORE, works manager of Longmore Bros., manufacturers of tubes, steel bars, etc., of Darlaston, Wednesbury, Staffs, has been appointed chairman of the Walsall Football Club. His father, Mr. Sam Longmore, had been chairman of the club for some years.

MR. J. B. KERR, chief draughtsman with the Wallsend Slipway & Engineering Company, Limited, has been appointed general manager of the company in succession to the late Sir Thomas McPherson. Mr. Kerr joined the company 19 years ago, becoming chief draughtsman three years later. He was previously with the Fairfield Shipbuilding & Engineering Company, Limited, for 16 years.

MR. DAVID L. THOMPSON, who has been appointed planning engineer with the North-East Engineering Bureau, was a production engineer in aircraft plants during the war, since when he has been with Fisher, Humphries & Company, Limited, engineers and boilermakers, etc., of Pershore, Worcs. He was responsible for the organisation of their associated concern set up a year ago at Newcastle-upon-Tyne.

MR. W. NITHSDALE, resident director at Hartlepool of Richardsons Westgarth & Company, Limited, engineers, ironfounders, etc., has received a presentation upon his retirement. He served his apprenticeship with the Fairfield Shipbuilding & Engineering Company, Limited, Glasgow, and later became managing director of Yarrow & Company, Limited, shipbuilders and engineers, also of Glasgow. He joined Richardsons Westgarth & Company in 1941.

MR. A. RAMSEY MOON has resigned his position as Director of the British Welding Research Association, to take effect on August 31. He has been largely responsible for the development of the Association, first as secretary of the Institute of Welding and Director of Research under the Welding Research Council, and for the past two years on the formation of the British Welding Research Association, as its Director, when the work of research was separated from that of the Institute.

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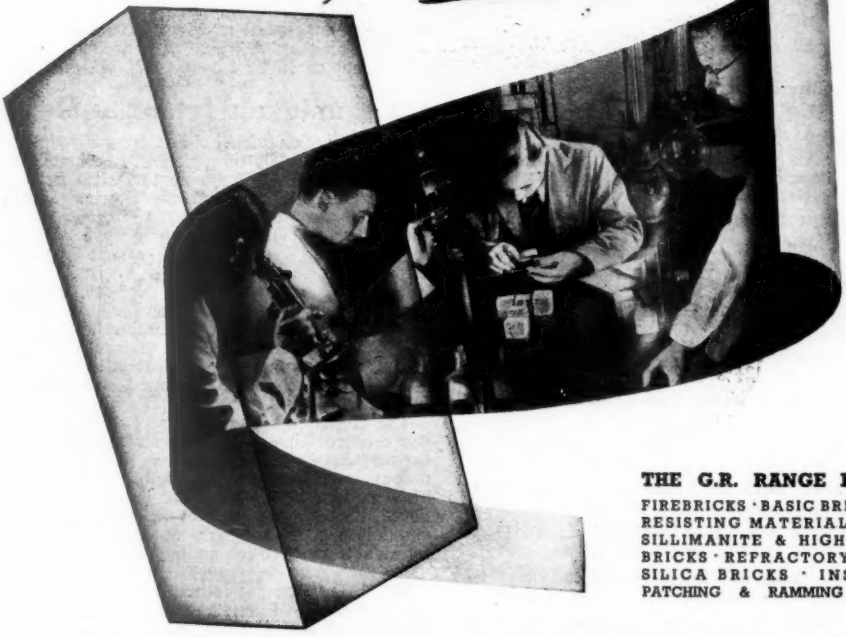

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Company News

(Figures for previous year in brackets.)

Franco Signs—Dividend of 10% (same).

Triplex Foundry—Dividend of 7½% (5%).

Harland & Wolff—Dividend of 7% (same).

Broom & Wade—Interim dividend of 7½% (same).

Inbucon—Final dividend of 6%, making 8% (same).

Matthew Hall & Company—Dividend of 25% (same).

R. A. Lister & Company—Interim dividend of 5% (same).

International Combustion—Interim dividend of 10% (same).

Park Gate Iron & Steel Company—Dividend of 10% (8%).

Twyfords—Final dividend of 12% (7½%), making 15% (10%).

Harrison (Birmingham)—Dividend of 25%, tax free (20%, tax free).

F. Francis & Sons—Final dividend of 15% (11%), making 20% (15%).

Scottish Stamping & Engineering Company—Dividend of 10% (same).

Milners Safe Company—Dividend of 7½% (same) and bonus of 2½% (same).

London Electric Wire Company & Smiths—Interim dividend of 2½% (2%).

Allen West & Company—Dividend of 7½% (same) and bonus of 2½% (nil).

Ambrose Shardlow & Company—Final dividend of 10% (5%), making 12½% (7½%).

Whessoe—Final dividend of 30% (same and special bonus of 10%), making 40% (50%).

F. H. Lloyd & Company—Final dividend of 7%, making 10% on increased capital (10%).

Climax Rock Drill & Engineering Works—Final dividend of 7½%, making 12½% (same).

N. Greening & Sons—Final dividend of 10% (7½%) and bonus of 5% (nil), making 17½% (10%).

Crompton Parkinson—Interim dividend on the ordinary and "A" ordinary stock of 7½% (same).

National Electric Construction Company—Net profit for 1946, after tax, £37,966 (£30,757); dividend of 10% (same).

John Thompson Engineering Company—Final dividend of 12½% (same) and bonus of 5% (same), making 22½% on larger capital (22½%).

Ransomes & Rapier—Final dividend of 5% (4%), making 7% (6%), tax free; final dividend on new shares of 2½%, making 3½%, tax free.

Armstrong Siddeley Development Company—Net profit for the year ended July 31, 1946, £516,463 (£474,579); dividend of 28½% (same); forward, £136,333 (£125,328).

Trussed Concrete Steel Company—Trading profit for 1946, after crediting £4,000 from income-tax reserves no longer required, £5,366 (loss of £45,758); forward, £15,235 (£12,344).

British Insulated Callender's Cables—Consolidated net profit for the 18 months from June 29, 1945, £2,722,143; to tax, £1,508,556; dividends to minority interests, £79,503; final dividend of 6%, making 10%; forward, £535,063.

Coventry Gauge & Tool Company—Net profit for the year ended August 31, 1946, after providing for taxation, etc., £76,805 (£47,461); dividend of 7½% and bonus of 7½%, both tax free, making 15%, tax free (same); forward, £204,249 (£156,535).

Peglers—Net profit for the year ended March 31, after providing £96,500 (£73,500) for taxation, £73,315 (£67,888); to general reserve, £25,000 (same); dividend of 45% on the "A" and "B" ordinary shares (30% and bonus of 10%); forward, £26,278 (£21,744).

Aluminium Interests Merged

The formation of a holding company, in which upwards of £5,000,000 of capital will be involved, is provided for under an agreement reached between Tube Investments, Limited, and the Hawker Siddeley Aircraft Company, Limited, who are to merge their aluminium interests. Each group will have an equal share in the holding company, which will be jointly administered.

The new company will take over the share capital of the subsidiary companies concerned of both groups, namely, High Duty Alloys, Limited (Hawker Aircraft Company) and the aluminium division of Tube Investments, which comprises the light alloy interests of the Reynolds Tube Company, Limited, and Reynolds Rolling Mills, Limited.

The holding company will have at its disposal extensive modern laboratories with resources and equipment for research and development in light alloys. Plans to be put in hand as soon as possible include the erection of a modern rolling mill, and in due course, it is believed, the company will be in a position to produce aluminium sheet and strip at prices which will offer formidable competition in the world market.

MR. J. O. DICK has retired from the board of Glenfield & Kenhedy, Limited, hydraulic engineers and iron-founders, of Kilmarnock.

MR. OLIVER SMALLEY, president of the International Meehanite Metal Corporation, has arrived in this country and will participate in the Meehanite research conference shortly to be held in York. Other arrivals are MR. F. S. GRIMWADE, managing director of the Grimwade Castings Pty., Limited, of Port Melbourne, N.S.W., and MR. JOHN SISSENER, secretary of the Norwegian Foundrymen's Association.

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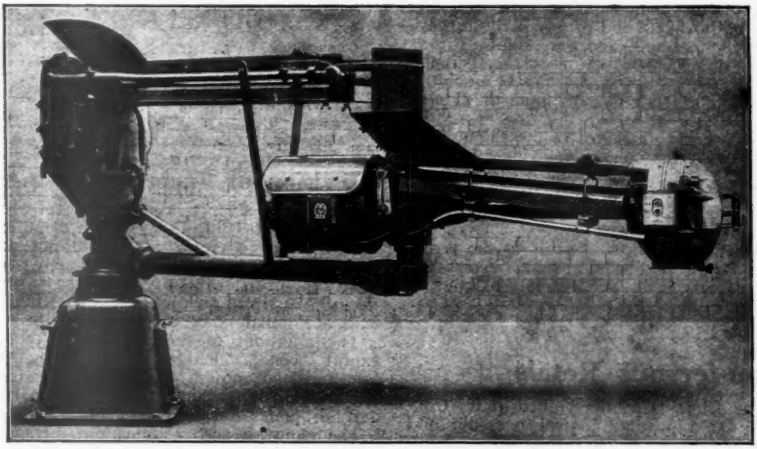

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Raw Material Markets

Iron and Steel

Production of foundry pig-iron will have to be substantially enlarged if the requirements of the light-castings industry and other consumers are to be covered. The chief difficulty at the present time is shortage of fuel, which precludes the introduction of additional blast furnaces. Consequently, apart from basic iron, all qualities of pig-iron are in short supply. Current output of high-phosphorus iron is much below requirements, while there is little hematite available after the needs of the steelworks have been met.

Wrought-iron works are well placed for business, but shortage of labour is handicapping their activities. There seems to be no likelihood of any early improvement in the supply of semis, and the outlook for the rolling mills is anything but reassuring. Home supplies are insufficient and it is hoped that larger quantities will become available from Canada and the United States.

Much concern is being expressed in the shipbuilding industry up and down the country in connection with steel supplies. The position has now assumed really serious proportions; short-time working and unemployment have been predicted at many yards unless there is an early improvement in the situation. The current allocation of steel to the shipbuilders is in the region of 50 per cent. of estimated requirements. A revision of the existing steel priority scheme is being urged in order to alleviate the shipyards' difficulties.

Non-ferrous Metals

President Truman has asked the United States Congress to extend the allocation control over tin and antimony for another year beyond June 30. Affirming that the retention of allocations and priority powers was essential as regards tin, tinplate and antimony, the President also stated that, in his opinion, it was necessary in the interest of all countries. Spot Straits tin is quoted at 80 cents per lb., New York. Exports of tin shipped from Malaya in May were 1,700 tons, bringing this year's total to 8,800 tons. Of the 1,700 tons for May, 900 tons went to the European Continent and 400 tons each to Canada and India.

The world supply position of lead is slow to improve, although it is possible that the present high price may not only have the effect of reducing demand, but also of increasing production. A striking symptom of this world famine is the report that British cablemakers have been undertaking the work of sheathing cables with lead for foreign customers under arrangements whereby the customers supplied the necessary lead. The American position, too, remains tight. The New York lead price is unchanged at 15 cents per lb.

There are indications that the international value of zinc continues to sag, although there has been no actual adjustment in the domestic quotations of the metal in London and New York.

United Kingdom Tin Position

The Ministry of Supply has released the following figures showing the United Kingdom tin position for the month of April:—

		Ministry.	Consumers.
		Long tons.	Long tons.
TIN METAL:			
Stocks at April 1		9,177	3,930
Arrivals		—	—
Production		285	—
		9,462	3,930
Deliveries:			
To U.K. consumers	2,132	—	2,132
For export	309	2,441	—
		—	6,062
Consumption		—	2,336
Stocks at April 30		7,021	3,726*
TIN ORE (Tin content):			
Stocks in U.K. at April 1		6,019	—
Stocks in U.K. at April 30		5,924	—

* Calculated. Reported 3,280 tons.

Revision of Export Licensing Controls

Changes in export licensing control are made by a new Board of Trade Order which came into operation on Monday. Certain goods will not require export licences as from that date, but supply considerations have rendered it necessary, however, to impose export licensing control on cast-iron ingot moulds and lead acid accumulators of all types and their parts.

The additions to the schedule of goods requiring export licences include the following:—Group 6(1), cast-iron ingot moulds; Group 12(2), lead acid accumulators of all types, and the following parts: containers and lids, plates and grids, separators, and vent plugs.

The removals and modifications include:—Group 5, mica, micafolium, micanite and mycalex, which may in future be exported without licence, while sulphur and mixtures containing sulphur are also freed from export licensing control; and Group 6, well-drilling machinery, which may in future be exported without licence.

The Order detailing the changes is S. R. & O., 1947, No. 1050, which will be obtainable in due course, price 1d., from H.M. Stationery Office, Kingsway, London, W.C.2, or through any bookseller.

MR. WILLIAM BUCHANAN, deputy chairman of Pease & Partners, Limited, pig-iron makers, etc., of Darlington, died on May 29. He was 58 years of age.

MR. JOHN STILES MARTIN, general manager for 30 years of T. W. Greenwell & Company, Limited, ship-repairers, etc., of Sunderland, died recently.

A CHIMNEY 120 FT. HIGH, the last landmark of the old Dinsdale Ironworks, near Darlington, has been felled. Two blast furnaces and a hoist tower were felled several weeks ago. The demolition is being carried out by W. H. Arnott, Young & Company, Limited, Darlington.